

Mercury Poisoning — Continued

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*Epidemiologic Notes and Reports***Formaldehyde Exposure at a
Mortuary Science Embalming Laboratory — Ohio**

In October 1979, a health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at an embalming laboratory at an Ohio college of mortuary science to determine if chemicals used during embalming operations were presenting a potential exposure problem. The request was prompted by the early-disability retirement of a 30-year-old embalming instructor, who had developed asthmatic bronchitis after 5 years of laboratory exposure.

Medical histories of 4 instructors who were working in the laboratory at the time of the investigation revealed that all gave positive histories of allergy. All were exposed to embalming fluids consisting of formaldehyde, phenol, unspecified preservatives, ketone, and ester solvents. This exposure was on a daily basis for periods ranging from 3 to 12 years. All noted symptoms of burning eyes and nose, dryness of mouth and throat, cough, headache, and lacrimation while using these chemicals.

To evaluate environmental exposures, air samples were taken for phenol and formaldehyde determination during a 2-day period. On the first day, when a greater-than-usual number of bodies were embalmed, the ventilation system was not in operation (not an unusual condition), and airborne contaminants accumulated. The second day's embalming were performed while the exhaust system was in operation.

Environmental sampling indicated the phenol concentrations were below the limits of detection (0.4 mg/sample). Formaldehyde, on the other hand, was found to exceed the current Occupational Safety and Health Administration (OSHA) standard of 3 parts per million (ppm) (1) in 2 samples (3.93 and 3.65) on the first day of evaluation. All sample concentrations exceeded the NIOSH-recommended ceiling of 1.0 ppm. On the second day of the evaluation, with ventilation and exhaust systems working properly, concentrations in all samples were within the NIOSH-recommended and OSHA standards.

Reported by the Hazard Evaluations and Technical Assistance Br, Div of Surveillance, Hazard Evaluations, and Field Studies, NIOSH, CDC.

Editorial Note: Formaldehyde gas may cause severe irritation to the mucous membranes of the respiratory tract and eyes. Sensory irritation (itching of the eyes, dry and sore throat, increased thirst, disturbed sleep) has been reported in workers in paper-processing plants at concentrations of 0.9 to 1.6 ppm (2). In another study, intense irritation of the eyes, nose, and throat was reported at levels ranging from 0.13 to 0.45 ppm (3). More recent studies conducted in funeral homes indicated that concentrations of airborne formaldehyde from 0.25 to 1.39 ppm evoked complaints of upper respiratory tract and eye irritation and headache among embalmers (4). The levels at which serious inflammation of the bronchi and lower respiratory tract would occur in humans are unknown;

Formaldehyde Exposure — Continued

inhalation of high levels, however, has caused chemical pneumonitis, pulmonary edema, and death.

Formaldehyde has recently been found to produce a high incidence of nasopharyngeal cancer in laboratory rats (5). Present recommendations and standards for exposure to this chemical are not based on these carcinogenicity data. NIOSH is currently initiating an occupational epidemiologic study to help evaluate the human carcinogenicity rate due to formaldehyde exposure.

The environmental results of this study demonstrate the potential for overexposure to formaldehyde for embalmers when proper ventilation and exhaust systems are not operating. Based on the results of this evaluation, and on the irritant and carcinogenic effects of formaldehyde, NIOSH has recommended that embalmers, pathologists, and others using this substance be aware of the need for proper ventilation, protective clothing, personal protective equipment, and periodic or continuous monitoring of the air-borne concentrations of formaldehyde in the workplace.

References

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(Continued on page 401)

TABLE I. Summary — cases of specified notifiable diseases, United States

(Cumulative totals include revised and delayed reports through previous weeks.)

DISEASE	33rd WEEK ENDING		MEDIAN 1975-1979	CUMULATIVE, FIRST 33 WEEKS		
	August 16, 1980	August 18, 1979		August 16, 1980	August 18, 1979	MEDIAN 1975-1979
Aseptic meningitis	270	397	207	2,888	3,215	2,285
Brucellosis	10	6	6	125	97	136
Chickenpox	392	336	308	155,164	170,637	149,452
Diphtheria	—	—	1	3	7	59
Encephalitis: Primary (arthropod-borne & unsp.)	22	52	50	430	497	517
Post-infectious	5	4	5	141	170	170
Hepatitis, Viral: Type B	387	286	286	10,825	9,087	9,444
Type A	576	582	600	17,009	18,587	19,584
Type unspecified	266	222	168	7,519	6,366	5,341
Malaria	52	19	17	1,213	419	339
Measles (rubella)	54	196	157	12,684	11,789	23,371
Meningococcal infections: Total	33	33	28	1,813	1,870	1,210
Civilian	33	33	28	1,806	1,852	1,202
Military	—	—	—	7	18	18
Mumps	78	84	112	6,933	10,914	15,624
Pertussis	54	44	44	912	872	872
Rubella (German measles)	32	65	65	3,196	10,513	14,606
Tetanus	2	1	2	41	40	42
Tuberculosis	558	555	628	17,383	17,638	19,135
Tularemia	6	12	3	114	129	89
Typhoid fever	15	15	11	274	297	250
Typhus fever, tick-borne (Rky. Mt. spotted)	50	77	45	775	731	730
Veneral diseases:						
Gonorrhoea: Civilian	21,031	21,139	21,139	615,121	616,951	616,951
Military	386	783	607	17,036	17,535	17,535
Syphilis, primary & secondary: Civilian	544	726	502	16,540	15,255	15,406
Military	6	4	4	200	185	190
Rabies in animals	110	124	69	4,223	3,173	1,938

TABLE II. Notifiable diseases of low frequency, United States

	CUM. 1980		CUM. 1980
Anthrax	—	Poliomyelitis: Total	6
Botulism (Colo. 1, Calif. 1)	38	Paralytic	4
Cholera (Calif. 1)	8	Poliomyelitis (N.J. 1, Ohio 1, Wash. 1, Oreg. 1)	57
Congenital rubella syndrome	43	Rabies in man	—
Laprony (Tex. 3, Calif. 1)	120	Trichinosis (N.J. 3)	78
Laptospiriosis (Calif. 1)	40	Typhus fever, flea-borne (endemic, murine) (La. 1)	44
Plague	8		

All delayed reports will be included in the following week's cumulative totals.

Formaldehyde Exposure — Continued

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▲This article was developed from NIOSH Health Hazard Evaluation Report #70-146-670. A summary of that report, as well as all Health Hazard Evaluation and Technical Assistance Reports since December 1979, is now available in a new quarterly publication called "Health Hazard Evaluation Summaries." It is available from NIOSH by writing or calling: Ms. Vivian Morgan, NIOSH, Publications Dissemination, 4676 Columbia Parkway, Cincinnati, Ohio, 45226; Phone: 513-684-8323.

Current Trends**Mortality due to Malignant Neoplasms — Florida**

In the state of Florida in 1978, the age-adjusted rate for deaths due to malignant neoplasms (cancer) was 132.1 per 100,000 population, which equalled the previous high in 1972 (Table 1). Provisional data for 1979 indicate a 3.7% increase in the number of cancer deaths. §

Data were classified into 4 groups: white males; white females; males, all other races; and females, all other races. White males continued to have the highest cancer mortality among the 4 groups, both in the number of deaths and in the unadjusted rates (Table 1).

TABLE 1. Malignant neoplasm (cancer) deaths and death rates per 100,000 population, by race and sex, Florida, 1950, 1960, and 1968-1978

YEAR	DEATHS					Age-Adjusted*	RATES				
	Total	Whites		All other races			Unadjusted				
		Male	Female	Male	Female		Total	White		All other races	
							Male	Female	Male	Female	
1950	3,661	1,634	1,438	292	297	115.3	129.8	149.4	129.0	98.0	94.4
1960	7,789	3,920	2,849	544	476	119.8	155.7	193.8	136.5	123.9	104.6
1968	12,047	6,292	4,377	807	571	122.3	185.6	238.5	156.0	160.0	105.0
1969	12,809	6,662	4,779	812	556	123.8	191.2	244.5	164.3	158.5	100.2
1970	13,716	7,081	5,130	913	583	127.8	200.1	253.9	171.6	177.2	104.1
1971	14,449	7,556	5,354	923	614	126.5	202.9	260.7	171.3	175.8	107.4
1972	15,953	8,292	6,036	950	666	132.1	214.4	273.6	183.6	176.9	113.6
1973	16,581	8,602	6,274	979	724	128.0	211.4	268.2	179.3	180.0	121.6
1974	17,767	9,226	6,835	1,037	669	125.8	215.4	268.9	186.6	189.2	110.1
1975	18,387	9,451	7,126	1,100	707	122.5	216.7	268.8	187.6	200.1	114.1
1976	19,500	10,155	7,472	1,160	712	129.3	228.0	287.5	194.3	209.7	114.9
1977	20,200	10,242	7,918	1,235	800	129.1	231.7	284.6	201.7	220.4	126.5
1978	21,639	11,066	8,522	1,261	783	132.1	241.3	297.9	210.6	222.4	122.6
1979†	22,432	11,444	8,846	1,296	840	NA‡	241.4	297.0	210.7	221.7	127.6

*Age-adjusted to U.S. 1940 standard population.

†Provisional data. ‡Not available.

§The age-adjusted rate for 1979 is not yet available.

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MORBIDITY AND MORTALITY WEEKLY REPORT

- International Notes
- 393 Occupational Mercury Poisoning – Nicaragua
- Epidemiologic Notes and Reports
- 395 Formaldehyde Exposure – Ohio
- Current Trends
- 401 Mortality due to Malignant Neoplasms – Florida
- 403 FDA Drug Bulletin Error

International Notes

Occupational Mercury Poisoning – Nicaragua

In May 1980, the detection of inorganic mercury in drinking water in Managua, Nicaragua, led to the discovery that a chemical plant had been discharging mercury into Lake Managua, the source of the city's water supply. An estimated 40 tons of mercury has been discharged, at increasing annual rates, into air and water during the 12 years of the plant's operation; the rate of discharge in 1980 was approximately 50 pounds per day. On further investigation, a major outbreak of occupational mercury poisoning was discovered in workers at the plant.

The plant, partially owned and managed by a firm based in the United States, manufactures chlorine gas and sodium hydroxide (caustic soda) from sodium chloride by the chloralkali process; this process involves the separation of sodium from chlorine by direct electric current in the presence of a mercury cathode (1). Inspection of the plant showed visible contamination with metallic mercury, including pools of mercury on the floor of several work areas. Since metallic mercury is highly volatile and vaporizes readily at room temperatures, there was also inhalation exposure. Workers had been provided no personal protective equipment and had not been informed of the hazards of this element.

Physical examinations were conducted on all 152 workers at the plant. Fifty-six (37%) were found to have clinical evidence of mercury intoxication with central nervous system (CNS) damage. Initially, the criteria of such intoxication were the presence of specific signs and symptoms (tremor, emotional lability/irritability, metallic taste, and gingivitis) plus the presence of one or more non-specific symptoms (insomnia, memory deficit, inability to concentrate, depression, dysarthria, diaphoresis, chills, cramps, weakness, and sialorrhea). Fifteen other workers (10%) were found to have at least 3 specific and 2 non-specific symptoms of mercury intoxication.

Fifty-four of the initial 56 workers with CNS signs or symptoms were examined further by a neurologist. Forty-five had objective tremor, 45 memory deficit, 45 difficulty in concentration, and 52 paresthesias. One had undergone hospitalization for treatment of psychiatric symptoms; later, he and 3 co-workers had been removed from the plant by health officials following the development of mercurialism.

Epidemiologic investigation indicated that the highest prevalence of mercurialism had occurred in "mercury cell" (vat) workers (12 of 16, 75%) followed by process operators (16 of 33, 48%), and maintenance workers (23 of 62, 37%); in office workers, supervisors, and others the prevalence rate was 12% (5 of 41). The interval from beginning of employment to onset of symptoms ranged from 7 months to 7 years.

As a result of this investigation, Nicaraguan authorities have ordered (1) lowering of